Porous-Tube Piezometers, Slotted-Pipe Piezometers, and Observation Wells

Taking readings. -These instruments can be grouped together since they are all read using the same basic concept, having similar equipment problems, and the maintenance for each is similar. These instruments measure water levels as water passes through a slotted pipe or porous stone and rises in an attached standpipe. Water-level readings are taken with an portable indicator as follows:

(1) Turn the indicator switch to the BATTERY CHECK position (if available) to determine the level of charge of the battery.

(2) Check for proper operation of the unit by immersing the probe in water and noting whether the device registers a closed circuit by the voltmeter, light, or sound modes.

(3) Remove the piezometer protective pipe cap on the installation and lower the probe into the standpipe. At the level where the circuit is closed, note the length of probe wire required to reach the water level from the top of the standpipe. These data are usually recorded to an accuracy of 0.01 feet on form 7-1600. The observer must use a separate pocket tape measure to obtain this accuracy. Measure from your mark on the cable to the nearest footmark on the cable with the pocket tape. When there are two standpipes in a hole, each must be identifiable so that the correct data can be determined for each piezometer. The standpipe of the lower piezometer should be cut off flush with the top of the protective pipe, and the standpipe of the upper piezometer should be cut off one-half inch above the top of the protective pipe. The standpipes should also be color-coded.

(4) Record the reservoir and tail water levels at the time of observation. The elevation at the top of the standpipe should have been determined previously.

(5) Replace and lock the protective cap.

Problems using readout equipment. -The typical water-level indicator will give the operator many years of service if it is properly maintained (see maintenance section below). The indicator works on a simple principle using the water in the borehole to complete the electrical circuit when the probe is immersed in water. A small voltage is generated and this voltage is amplified in the transistorized circuit contained in the cable reel of the meter. This voltage is read directly on a voltage meter, which will light an indicating light, or sound a beeper. One indicator has a sensitivity knob which is designed to measure saline and/or contaminated water. By testing the water contained in your well, you are able to determine which setting should be used with this meter. If the knob is set lower than necessary, the accuracy of the meter will be reduced.

When measuring water levels in piezometers that are not vertical(greater than + 15 degrees from vertical), condensation will build up within the pipe. This condensation will give the observer a false water-depth reading. A sensitivity switch on the water meter can be set at a low setting, which will allow the probe to

pass this condensation and read the water level, but the depth reading could still be inaccurate.

Another problem related to measuring accuracy water depths is caused by chemicals that have entered the standpipe. Chemicals like diesel fuel or oil will enter the water if they were used in an attempt to retard the setting of bentonite pellets used to seal a piezometer in the drill hole. These chemicals will float on the water level within the well and give false readings. These chemicals have been bladed out, blown out, and even wiped out with little success. The 3M company produces an absorbent material, which can be used to soak up the diesel fuel and remove it from the well. This material comes in sheets, 18 inches by 18 inches, and needs to be cut to fit into the standpipe. Use 3M Brand sorbents material No. T-156.

Most water-level indicators are incremented every 1-foot over their length. To take measurements to 0.01 foot, the observer must use a separate pocket tape measure. A good tape to use is a Lufkin Engineers Ultralok 12-foot W312D, which is graduated in tenths and one-hundredths of a foot. When taking a reading of a water level measurement, place your hand on the electrical cable at the top of the protective pipe or piezometer pipe (always be consistent as to which is used) when the probe indicates the water level. Using the pocket tape, measure the distance from the footmark below your hand to your hand. Add this measurement to the footmark and you have your water depth.

Maintenance. -The only maintenance that should be required with most water-level meters is changing the batteries and keeping the electrical cable clean and in good condition. Always turn off units to save battery life.